The Australian Ants of the Genus Aphaenogaster, Mayr.[1]

By William Morton Wheeler.

(Communicated by Arthur M. Lea.)

[Read July 13, 1916.]

Plates XXI. and XXII.

In 1858 Frederick Smith described from Melbourne, Victoria, under the name of *Myrmica (Monomorium) longiceps*, a very common and widely-distributed Australian ant, which was later referred by Mayr to the genus *Aphaenogaster*. It was subsequently placed in the subgenus *Ischnomyrmex*, Mayr, and recently changed to *Deromyrma* by Forel, because the type of *Ischnomyrmex (longipes*, F. Smith) proved to be a *Pheidole*. Mayr in 1876 described the male and female of what he believed to be *A. longiceps*, Sm., from specimens taken in Queensland and New South Wales. Although Smith's description is sufficiently clear to indicate the modern generic allocation of his species, it was far from satisfactory for specific identification, and confusion at once resulted when Forel, in 1902, distinguished two Australian forms of *Aphaenogaster*, one from Adelaide, South Australia, which he referred to Smith's *longiceps*, and another from Victoria and New South Wales, which he described as a new subspecies, *ruginota*. For many years Forel and Emery believed that there were two forms of *Aphaenogaster* in Australia, the typical *longiceps* and Forel's subspecies *ruginota*; but as Smith's and Mayr's descriptions might apply to either, Emery in 1913 sent specimens to Mr. Meade-Waldo, who compared them with Smith's type, which is still in the British Museum. From this comparison Emery concluded that the Queensland form must be the true *longiceps* and the more southern form the subspecies *ruginota*. He gave figures of the males of what he took to be the two forms, but the differences between them are insignificant. In 1915 Forel elevated his *ruginota* to specific rank, and pointed out the differences that separate it in all three phases from what he regarded as the true *longiceps*. Not knowing which of the

(1) Contribution from the Entomological Laboratory of the Bussey Institution, Harvard University. No. 116.

two had been described by Smith under this name, he proposed the name *pythia* for his own *longiceps*, in case *ruginota* should prove to be identical with Smith's type.

A study of a large number of specimens of *Aphaenogaster* collected during 1915 by myself in many localities in New South Wales and Queensland, and of many others recently loaned me for study by the Museum of South Australia, from Victoria, South and Western Australia, enables me to settle the matter under discussion. It happens that there are not only two, but *three* distinct, though superficially very similar species of *Aphaenogaster* in Australia, and that all three have had a share in the confusion. One, an undescribed species, which I shall call *barbigula*, ranges over Western and South Australia and eastward to the western portions of Victoria and New South Wales. I feel certain that this is the form called *longiceps* by Forel, when he is referring to specimens from Adelaide, Victoria, and Western Australia. In fact, some of my specimens from Victoria are from the same lot as some of those cited by Forel (Sea Lake, collected by J. C. Goudie). Of the two other species, one, extremely common and widely-distributed throughout the coastal portions of Victoria and New South Wales and the dryer portions of Queensland, corresponds to Forel's *ruginota;* the other, Forel's *longiceps*, seems to be rare and local, and is known only from Queensland and northern New South Wales. Suspecting that Forel and Emery had not interpreted Smith's *longiceps* correctly, I forwarded specimens of all three species to my friend, Mr. Horace Donisthorpe, who kindly compared them very carefully with Smith's type. He writes me that the type is undoubtedly what Forel called *ruginota*, and not what he called *longiceps*. Hence *ruginota* becomes a synonym of *longiceps*, Smith, and the rarer Queensland form. Forel's *longiceps*, which was unknown to Smith, must take the name *pythia*, Forel. That both of Emery's forms were *longiceps* is proved by his figures of the males, since the male *pythia* is quite different. Mayr probably confused both species. At any rate, his description will apply to the male and female of either, but as he introduced no new names his intepretation is now a matter of little moment. The female of *longiceps* had been previously described by Smith under the name of *Atta antipodum*.

There is some doubt concerning the subgeneric position of the Australian *Aphaenogasters*. Forel placed *longiceps* in the subgenus *Ischnomyrmex* because the male and female have only one cubital cell in the fore wing. When the type of *Ischnomyrmex* proved to be a *Pheidole*, he changed the name of the subgenus to *Deromyrma* and designated *A*

swammerdami, Forel, of Madagascar, as its type. This form and several other paleotropical and neotropical species have the head in the worker and female constricted behind to form a narrow neck, whereas another series, also with a single cubital cell in the wings (*cockerelli* and *albisetosa* of North America, *sagei* of the Himalayas, and *longiceps*), do not have the head narrowly constricted behind. Forel preferred to retain these species in the subgenus *Deromyrma*, because he attributed more value to the wing venation than to the shape of the head (Rev. Zool. Afr., 2, 1913, p. 350). Viehmeyer continued the subdivision of the genus *Aphaenogaster* by separating out the Papuan species *dromedarius*, *loriae*, and *quadrispina*, as a distinct subgenus, *Planimyrma* (Zool. Jahrb. Abth. f. Syst., 37, 1914). More recently Emery has carried the subdivision considerably further. He regards the Mediterranean species of the *testaceopilosa* group as constituting the subgenus *Aphaenogaster sens. str.* (with *sardoa*, Mayr, as the type). These forms have small females, with narrow thorax, which seem never to bear wings. The large series of circumpolar species allied to *subterranea*, Latreille, with large, winged females and two cubital cells, Emery places in a new subgenus, *Attomyrma*. The North American species, *cockerelli* and *albisetosa*, he assigns to another subgenus, *Novomessor*. Although the males and females of the Australian species and the Himalayan *sagei* have only one cubital cell, he prefers to place them in *Attomyrma* rather than in *Deromyrma*. While I agree that the Australian species should be removed from the subgenus *Deromyrma*, I do not believe that they should be assigned to *Attomyrma*. The three species form a very compact group, characterized not only by the presence of only one cubital cell, but also by their geographical isolation and the size of the female, which is much larger in proportion to the worker than in any of the other species of *Aphaenogaster*. They may, therefore, properly constitute a distinct subgenus, for which I propose the name *Nystalomyrma*, subgen. nov., with *Myrmica longiceps*, Smith, as the type. This leaves only the Himalayan *sagei* without a definite position. It may be placed in *Attomyrma*, as Emery suggests, especially as the female is only slightly larger than the largest worker forms.

It seems necessary to dwell at length on the taxonomic matters, because the three species of *Aphaenogaster*, and particularly *longiceps*, are among the commonest or most conspicuous ants in the *Eucalyptus* forests, and therefore familiar to all Australian entomologists. The species of *Nystalomyrma* are insectivorous, like most other species of *Aphaenogaster*, and live by preference in sand or sandy soil,

usually in moderately shady spots, where each colony makes numerous scattered or contiguous craters, often several inches in diameter, with very large entrance galleries, descending perpendicularly and deeply into the ground. These nests are often around the roots of trees, more rarely under prostrate logs or large stones. *Longiceps* and *pythia*, and doubtless also *barbigula*, which I have not seen alive, are nocturnal, so that although their earthworks are conspicuous objects in the "bush," they are quite deserted by the ants during the day. The colonies seem to be rather populous, but the individual workers are very timid. It is certainly astonishing that such small, slender insects should be able to build such extensive nests. At Koah, in Northern Queensland, I visited a piece of dry forest in which whole acres of the soil were covered with the craters of *longiceps*. These were larger and more compact than those seen in sandy localities in Queensland and New South Wales, and had very smooth, funnel-like entrances. At first I believed the nests at Koah to be the work of a distinct species, but the ants proved to be indistinguishable from typical *longiceps* in the other localities, so that the differences in the nests were probably due to differences in the soil. At Salisbury Court, near Uralla, New South Wales, while camping in the woods with Mr. W. W. Froggatt and his son, I was able to watch the workers of *longiceps* during the night, while they were busily bringing out their pellets of sand and earth and depositing them on the craters. The workers of *barbigula* have a true "psammophore" of long hairs on the lower-surface of the head, like many desert ants of various genera (*Pogonomyrmex*, *Cratomyrmex*, *Messor*, *Holcomyrmex*, *Myrmecocystus*, *Cataglyphis*, *Melophorus*, etc.), and therefore probably use this organ as a basket in which to carry out the moist sand-pellets. A note on the label in one bottle of this species received from the Museum of South Australia refers to its "nesting in sand." The following descriptions and figures will facilitate the identification of the Australian species of *Aphaenogaster*.

Aphaenogaster (Nystalomyrma) longiceps, F. Smith.

Pl. xxi., figs. 1-3; pl. xxii., figs. 1-4.

Myrmica (Monomorium) longiceps, F. Smith: Cat. Hymen., Brit. Mus., 6, 1856, p. 128, female.

Atta antipodum, F. Smith: *ibid.*, p. 166, female.

Myrmica longiceps, Lowne: Entomolgist, 2, 1865, p. 334.

Aphaenogaster longiceps, Mayr: Journ. Mus. Godeff, 12, 1876, p. 43, male, female (in part); Verh.: Zool. bot. Ges. Wien., 36, 1886, p. 359; Dalla Torre: Cat. Hymen., 7, 1893, p. 103.

Aphaenogaster(?) *antipodum*, Mayr: *ibid.*, p. 360, female.

Aphaenogaster antipodum, Dalla Torre: Cat. Hymen., 7, 1893, p. 98, female; Froggatt: Agric. Gaz. N.S.W., 1905, p. 21, female.

Stenamma longiceps, Froggatt: *ibid.*, p. 17.

Stenamma (Ischnomyrmex) longiceps, race *ruginota*, Forel: Rev. Suisse Zool., 10, 1902, p. 440, two females.

Aphaenogaster longiceps, subsp. *ruginota*, Emery: Boll. Lab. Zool. Gen. Agrar. Portici, 8, 1914, p. 181, fig. 1*b*, male.

Aphaenogaster longiceps, Emery: *ibid.*, p. 181, fig. 1*a*, male.

Aphaenogaster (Deromyrma) ruginota, Forel: Ark. Zool., 9, 1915, p. 75, two females and male.

Aphaenogaster (Attomyrma) longiceps, Emery: Rend. R. Acad. Sc. Ist. Bologna, 1915, p. 71.

Worker.—Length, 5-7 mm.

Head about one and one-quarter times as long as broad, as broad in front as behind, with feebly convex sides, rounded posterior corners and a pronounced, reflected occipital margin. Eyes rather small, convex at the middle of the sides of the head. Mandibles long, with rather straight external borders, their apical borders irregularly denticulate, with three larger teeth at the tip. Clypeus moderately convex, its anterior border broadly rounded and entire. Frontal carinae subparallel; frontal area large, triangular; frontal groove indistinct. Antennae slender; scapes extending about one-fourth their length beyond the occipital border of the head, their tips distinctly incrassated; funiculi with distinct 4-jointed club, and all the joints more than twice as long as broad. Thorax rather long and slender, pronotum slightly flattened above, rising posteriorly to the mesonotum, which slopes rapidly backward and is slightly concave anteriorly in profile, marginate on each side above and along its inferior border. Mesoepinotal constriction abrupt and rather deep. Epinotum as high as long, its base horizontal and straight, forming a right-angle with the shorter declivity; the spines somewhat curved at base, slender and acute, less than half as long as the declivity, nearly as long as their distance apart at the base and directed backward and slightly outward. Petiole with a slender peduncle shorter than the node, which is rather high and rounded above, its anterior slope rising abruptly and perpendicularly from the peduncle. Seen from above, the node is longer than broad. Postpetiole a little higher than the petiolar node and somewhat broader. Legs long and slender; spurs of the hind tibiae very small.

Shining; mandibles subopaque, coarsely striated; clypeus and head above smooth and shining, longitudinally rugose

between the frontal carinae and eyes, the rugae diverging behind. Cheeks with coarse, elongate punctures. Mesonotum and epinotum subopaque and rugose-punctate, the rugae irregular on the sides and often transverse on the base of the epinotum; pronotum and declivity of epinotum smooth and shining, as are also the petiole, postpetiole, gaster, and legs. Antennal scapes and legs with sparse piligerous punctures.

Body, including the antennae and legs, covered with rather abundant, erect, coarse, yellowish hairs; those on the scapes and tibiae standing off at an angle of about 30° to 45°.

Yellowish-brown to piceous or castaneous-brown; appendages paler; first gastric segment in pale specimens often darker behind; mandibular teeth black.

Female.—Length, 10·5-12 mm.; wings, 13-14 mm.

Head rather small, scarcely longer than broad, subrectangular, very slightly broader behind than in front. Antennal scapes reaching about one-fourth their length beyond the posterior border of the head. Thorax large; mesonotum overarching the small pronotum in front, flattened behind; seen from above, distinctly longer than broad; scutellum longitudinally impressed in the middle; base of epinotum sloping, longer than the declivity, the spines long, blunt, directed upward, outward, and backward. Petiolar node compressed anteroposteriorly, its upper border feebly impressed in the middle; postpetiole short, broader than long. Gaster large. Wings with large discal cell and only one cubital cell.

Sculpture resembling that of the worker, but the whole upper-surface of head and cheeks longitudinally rugose, except a small median occipital area which is shining and coarsely punctate, and the clypeus, which is transversely rugulose on the sides. Thorax, including the mesopleurae, smooth and shining; epinotum sharply rugose, the rugae on the base transverse in front, arcuate behind, on the sides irregular above, longitudinal below and extending forward on to the mesosterna.

Pilosity like that of the worker.

Colour darker, castaneous; legs, usually including the coxae, yellowish; wings distinctly and uniformly infuscated throughout, radial vein and apterostigma dark-brown, remaining veins paler.

Male.—Length, 5-6 mm.; wings, 6-6·5 mm.

Head, excluding the eyes, distinctly longer than broad, convex behind and above, not broader behind than in front, its occipital border with a pronounced, strongly-reflected margin. Cheeks very short; eyes large and convex.

Mandibles narrow, with two or three teeth. Clypeus convex, with rounded entire anterior border. Antennal scapes slender, somewhat shorter than the head; funiculi with joints gradually increasing in length distally, but without distinct club; first joint slightly swollen. Thorax large; mesonotum, seen from above, as long as broad, very convex, especially in front, where it strongly overarches the very small pronotum. Mesosterna and mesopleurae large and very convex. Epinotum narrow, prolonged backward, its base rapidly sloping and more concave anteriorly, its posterior portion somewhat higher, subnodiform, and with very short declivity. Petiolar and postpetiolar nodes low and rounded, the latter longer than broad and somewhat broader than the former. Legs long and very slender. Venation of wings as in the female.

Pilosity and sculpture much as in the worker, but the hairs somewhat finer and the head much less rugose in front, the mesopleurae and upper-surface of the epinotum smooth and shining and the mandibles shining and sparsely punctate.

Colour as in the female, but the head darker, the mandibles yellow, and the wings and apterostigma somewhat paler.

Hab.—Victoria: Melbourne (type locality); Yarra district (W. W. Froggatt); Swan River (locality of female, *Atta antipodum*, cited by F. Smith). New South Wales: Jenolan Caves (J. C. Wiburd); Port Hacking (W. B. Gurney); National Park, near Sydney, Sutherland, Leura, Katoomba, Hornsby, Manly, Sandringham, Bulli Pass, Gosford, and Uralla (Wheeler); Fitzroy Falls (R. J. Tillyard); Sydney (A. M. Lea); Sydney and Katoomba (F. Silvestri); Shoalhaven district (W. W. Froggatt); Dorrigo (W. Heron). Queensland: Mount Tambourine and Colosseum (E. Mjöberg); Townsville (F. P. Dodd); Brisbane and Koah (Wheeler); Bribie Island (Wheeler and H. Hacker).

Although series of specimens from different localities vary more or less in average size, in colour, sculpture, and the length and shape of the epinotal spines, it seems inadvisable on the basis of the material examined to confer names on the varieties of this species.

Aphaenogaster (Nystalomyrma) pythia, Forel.

Pl. xxi., figs. 4-6; pl. xxii., figs. 5-8.

Aphaenogaster longiceps, Mayr.: Journ. Mus. Godeff., 12, 1876, p. 43, female, male (in part).

Aphaenogaster (Deromyrma) longiceps, Forel: Ark. Zool., 9, 1915, p. 76, two females and male.

Aphaenogaster (Deromyrma) pythia, Forel: *ibid.*, p. 76, two females and male.

Worker.—Length, 4-5·5 mm.

Averaging smaller than *longiceps*. Head scarcely longer than broad, distinctly broader behind than in front, with less-rounded posterior corners than in *longiceps*, and with less-constricted, though distinctly marginate, posterior border. Eyes distinctly less convex, antennae shorter, though the scapes surpass the occipital border of the head by nearly one-fourth their length; funicular joints shorter. Pronotum and base of epinotum more convex and rounded above in profile; mesoëpinotal constriction shorter. Epinotal spines shorter, much further apart at their base than long, and directed more upward. Petiolar node rising less abruptly from the peduncle. Legs shorter and stouter, gaster perhaps a little larger than in *longiceps*.

Smoother and more shining; mandibles subopaque and shining; the rugae between the frontal carinae and eyes feebler; epinotum smooth and shining above; sides of mesonotum and epinotum much more finely rugulose-punctate, so that their surfaces are also more shining.

Hairs finer and paler and a little more oblique on the legs and antennal scapes.

Colour usually paler and more yellowish than in *longiceps*.

Female.—Length, 9·5-11 mm.; wings, 12·5-13 mm.

Smaller than the female of *longiceps*, with the posterior corners of the head more pronounced and less rounded, the eyes somewhat less convex, the antennae, thorax, and legs shorter, and the epinotal spines smaller and acute. Venation as in *longiceps*.

Sculpture much as in *longiceps*, but the head more subopaque and more finely rugose. Gaster and upper-surface of thorax very smooth and shining.

Pilosity as in the worker.

Colour distinctly paler than that of the female *longiceps*, wings less deeply infuscated, yellowish-hyaline, with the radial vein and apterostigma dark-brown. Mesonotum with three large longitudinal brown blotches, gaster behind the first segment brownish-yellow, as are also the legs, including the coxae.

Male.—Length, 4-4·5 mm.

Smaller than the male of *longiceps*, the head and antennae shorter, the former scarcely longer than broad, excluding the eyes; thorax much shorter and broader, the

pronotum and scutellum seen together from above scarcely longer than broad. In profile the scutellum is more convex and projecting, the anterior portion of the base of the epinotum descends more abruptly, and the nodiform posterior enlargement is more pronounced in profile, but less pronounced when seen from above. The nodes of the petiole and postpetiole are much lower than in *longiceps*.

Sculpture, colour, and pilosity much as in that species.

Hab.—Queensland: Herberton (type locality) and Cedar Creek (E. Mjöberg); Gayndah; Peak Downs; Rockhampton; Kuranda and Enoggera (Wheeler). New South Wales: Dorrigo (W. Heron).

Aphaenogaster (Nystalomyrma) barbigula, sp. nov.

Pl. xxi., figs. 7 to 9; pl. xxii., fig. 9.

Stenamma (Ischnomyrmex) longiceps, Forel: Rev. Suisse Zool., 10, 1902, p. 439, female; Fauna S.W. Aust., Hamb. Exped., 1, 1907, p. 284, two females and male.

Aphaenogaster (Deromyrma) longiceps, Forel: Bull. Soc. Vaud. Sc. Nat., 49, 1913, p. 187, female.

Worker.—Length, 4·5-5·5 mm.

Head regularly-elliptical, about one and one-fifth times as long as broad, not broader behind than in front, with convex sides, rounded behind the eyes, and without posterior corners. Occipital border feebly reflexed. Eyes moderately convex. Mandibles irregularly denticulate, with three larger apical teeth. Clypeus, frontal carinae, and frontal area much as in *longiceps;* frontal groove indistinct. Antennae rather long, scapes incrassated distally, extending less than one-fourth their length beyond the posterior border of the head, funiculi distinctly 4-jointed, all the joints shorter than in *longiceps*. Pronotum and base of epinotum rounded and convex in profile; mesoëpinotal constriction long and pronounced, epinotal spines reduced to small, rather acute, suberect teeth. Petiolar node rounded, lower than in *longiceps* or *pythia*. Postpetiole scarcely longer than broad, decidedly broader than the petiole, in profile with abrupt posterior slope. Legs rather slender; posterior tibiae with small spurs.

Shining; mandibles subopaque, longitudinally striate; clypeus feebly and transversely rugulose; head very smooth and shining above and behind, sharply, longitudinally rugose between the frontal carinae and eyes; cheeks only with several small, scattered, piligerous punctures. Thorax smooth and shining, with the sides of the mesonotum and epinotum punctate-rugose, the rugae being somewhat longitudinal on

the former; remainder of body smooth and shining, with small, scattered piligerous punctures.

Hairs as in *longiceps* and *pythia*, except that they are very long on the gula, forming a well-developed psammophore; on the scapes and legs they are more oblique than in *longiceps* and more as in *pythia*.

Colour variable and like that of *longiceps*.

Female.—Length, 13 mm.; wings, 13·5 mm.

Similar to the females of the two preceding species. Head subrectangular, a little broader behind than in front, with rounded posterior corners. Antennal scapes extending only a short distance beyond the posterior border of the head. Thorax rather long; base of epinotum long, its spines acute, shorter than in *longiceps* and directed downward and backward. Scutellum and petiolar node without median impression. Venation of the wings as in the preceding species.

Smooth and shining; mandibles subopaque, finely striate; clypeus transversely rugulose; head finely, longitudinally rugose; rugosity on the base of the epinotum above fine, indistinct and transverse, more distinct and longitudinal on the sides.

Hairs similar to those of the worker but rather short, except on the gula, where they form a psammophore, as in the worker.

Colour uniformly yellowish-ferruginous, with slightly paler legs. Wings yellowish-hyaline, as pale as in *pythia*, with dark-brown radial vein and apterostigma; remaining veins resin-coloured.

Hab.—South Australia: Adelaide (type locality) (A. M. Lea and Rothney); Meningie (L. H. Mincham); Gawler (A. M. Lea); Karoonda to Peebinga (G. E. H. Wright). Western Australia: Dongarra; Gooseberry Hill; Wallaby Island; Beverley (F. H. Duboulay). Victoria: Sea Lake (J. C. Goudie). New South Wales: Yanco (W. W. Froggatt).

This species, described from numerous workers from many of the localities cited above and a single female taken by Mr. G. E. H. Wright between Karoonda and Peebinga, is readily distinguished from *longiceps* and *pythia* by the conspicuous psammophore of the worker and female, by the peculiar shape of the head and very short epinotal spines of the worker, and by the downwardly-directed epinotal spines of the female. The male seems to have been seen by Forel, but was not described, as it was referred to *longiceps*. When again taken it will probably be found to differ as much from the males of *longiceps* and *pythia* as the worker and female differ from the corresponding phases of these species.

DESCRIPTION OF PLATES.

Plate XXI.

Fig. 1. *Aphaenogaster (Nystalomyrma) longiceps*. F. Smith. Head of worker, dorsal view.
,, 2. Worker, body in profile.
,, 3. Head of female, dorsal view.
,, 4. *Aphaenogaster (Nystalomyrma) pythia*. Forel. Head of worker, dorsal view.
,, 5. Worker, body in profile.
,, 6. Head of female, dorsal view.
,, 7. *Aphaenogaster (Nystalomyrma) barbigula*, n. sp. Head of worker, dorsal view.
,, 8. Worker, body in profile.
,, 9. Head of female, dorsal view.

Plate XXII.

Fig. 1. *Aphaenogaster (Nystalomyrma) longiceps*. F. Smith. Thorax, petiole, and postpetiole of female in profile.
,, 2. Same of male.
,, 3. Thorax of male, dorsal view.
,, 4. Head of male, dorsal view.
,, 5. *Aphaenogaster (Nystalomyrma) pythia*, Forel. Thorax, petiole, and postpetiole of female in profile.
,, 6. Same of male.
,, 7. Thorax of male, dorsal view.
,, 8. Head of male, dorsal view.
,, 9. *Aphaenogaster (Nystalomyrma) barbigula*, n. sp. Thorax, petiole, and postpetiole of female in profile.